Path of Exile Economy Analysis

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***Abstract*—This project utilizes the Path of Exile economy from the Mercenaries League to analyze the changes of a simulated economy. Using poe.ninja, over 40,000 rows of economy data over a 4 month period are acquired and analyzed to identify trends and large shifts.**

I. Dataset Description

- Mercenaries League Economy. The data is inspired by the Stack Overflow data dumps, licensed as cc-by-sa.
- https://poe.ninja/poe1/data. Free open download.
- The currency portion of the data is 2MB being, 6 columns and more than 40,000 rows. Optionally, the data can be expanded largely to include items such as unique items or mapping/fragment pieces.
- Contains daily snapshots of each individual currency item and its relative value in comparison to 'Chaos Orbs' (the general community agreed upon trading currency). Furthermore, it contains a confidence column to help eliminate unclean data and evidence of price-fixing in the market.

A. Dataset Example

TABLE I
Sample Currency Economy Data from poe.ninja (Abyss League)

League	Date	Get	Pay	Value
Abyss;	2017-12-09;	Exalted Orb;	Chaos Orb;	26.16644;
Abyss;	2017-12-10;	Exalted Orb;	Chaos Orb;	35.92556;
Abyss;	2017-12-11;	Exalted Orb;	Chaos Orb;	43.5739;
Abyss;	2017-12-12;	Exalted Orb;	Chaos Orb;	47.99698;
Abyss;	2017-12-13;	Exalted Orb;	Chaos Orb;	45.45841;
Abyss;	2017-12-14;	Exalted Orb;	Chaos Orb;	41.32816;

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II. Discovery Questions

A. How do different currencies trend up or down together?

This question examines whether groups of currencies exhibit similar price movements over the course of the league. By analyzing correlations and clustering currency time-series data, this analysis aims to identify currencies that rise and fall together, potentially demonstrating shared gameplay functions, crafting dependencies, or common demand drivers. Understanding these co-movement patterns provides insight into the structural relationships within the in-game economy.

B. How does currency value differ between early and late stages of the league?

This question investigates how currency value rankings change between the early and late stages of the league. By comparing relative values across different time windows, this analysis highlights shifts in economic importance as player progression, crafting availability, and endgame activities evolve. Identifying these changes helps characterize distinct economic phases within the league lifecycle.

C. Which currencies behave as outliers compared to overall market trends?

This question aims to identify currencies whose value behavior deviates significantly from the general market trends observed during the league. By comparing individual currency trajectories against aggregate market movement, the analysis highlights outliers characterized by unusually high volatility, abrupt price changes, or sustained divergence. These currencies may reflect speculative activity, sudden shifts in player demand, or the impact of game updates and league mechanics.

III. Planned Data Mining Techniques

The goal of the planned techniques is to explore patterns and relationships in the in-game currency economy, rather than to predict future prices. Since this is an exploratory study, the focus is on methods that can reveal trends, groups, and unusual behavior among currencies over time.

Before applying any analysis, the data will be cleaned, normalized, and organized so that each currency is represented as a time-series of daily values. This allows us to compare currencies and track changes throughout the league.

Clustering and dimensionality reduction are the main techniques. Clustering will group currencies that behave similarly, showing which rise or fall together. Dimensionality reduction (PCA) will simplify the data and make it easier to visualize overall trends and patterns. Together, these methods provide a clear view of how the video game economy evolves.

A. Clustering

Clustering will be used to group currencies that show similar patterns over time. By looking at how each currency's value changes daily, we can identify sets of currencies that rise and fall together or behave in similar ways. This helps highlight early-game versus late-game currencies, stable baseline currencies, and more volatile or unusual ones. Clustering provides

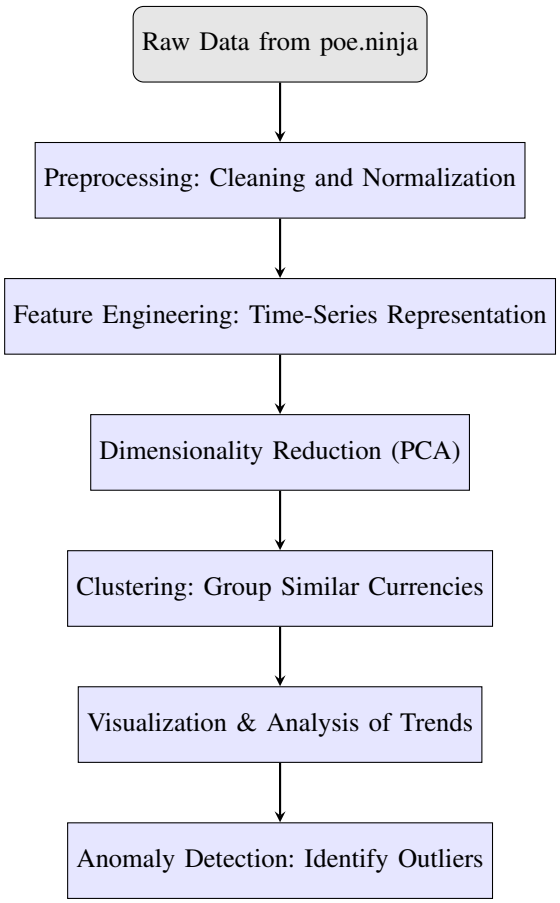
a way to see structure in the market without assuming anything about the outcome.

B. Dimensionality Reduction (PCA)

Principal Component Analysis (PCA) will be used to simplify the dataset and make patterns easier to see. Each currency has many daily values, so PCA reduces this high-dimensional data to just a few key components that explain most of the variation. This helps visualize overall trends, understand what drives changes in currency values, and support the clustering results by showing how currencies are related in a lower-dimensional space.

IV. Planned Analysis Pipeline

A. Flowchart



B. M2: Initial Implementation

- Perform exploratory data analysis (EDA) on the currency dataset, including visualizations of trends and distributions.
- Conduct a first attempt at pattern discovery using either clustering or association rule mining.
- Document preliminary findings and observations for further analysis in later milestones.

C. M3: Complete Implementation

- Apply multiple data mining techniques (clustering, PCA, and optionally anomaly detection) to the dataset.
- Compare and analyze patterns discovered by different techniques.
- Ensure code quality, proper documentation, and reproducibility of results.
- Refine interpretation of findings based on observed trends and relationships.

D. M4: Final Deliverable

- Produce a polished and fully reproducible analysis.
- Deliver meaningful interpretations of discovered patterns in the currency economy.
- Submit a portfolio-ready repository containing clean code, analysis notebooks, and visualizations.
- Prepare a final presentation or demonstration video summarizing results.

E. Anticipated Challenges

- Ensuring high-quality preprocessing and handling missing or inconsistent data.
- Interpreting patterns in noisy or volatile currency value trends.
- Balancing multiple techniques and integrating their results into a coherent analysis.
- Maintaining reproducibility and clarity in both code and visualizations for final submission.

References

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